SF6 Results from MWPC+ThGEM Hybrid readout

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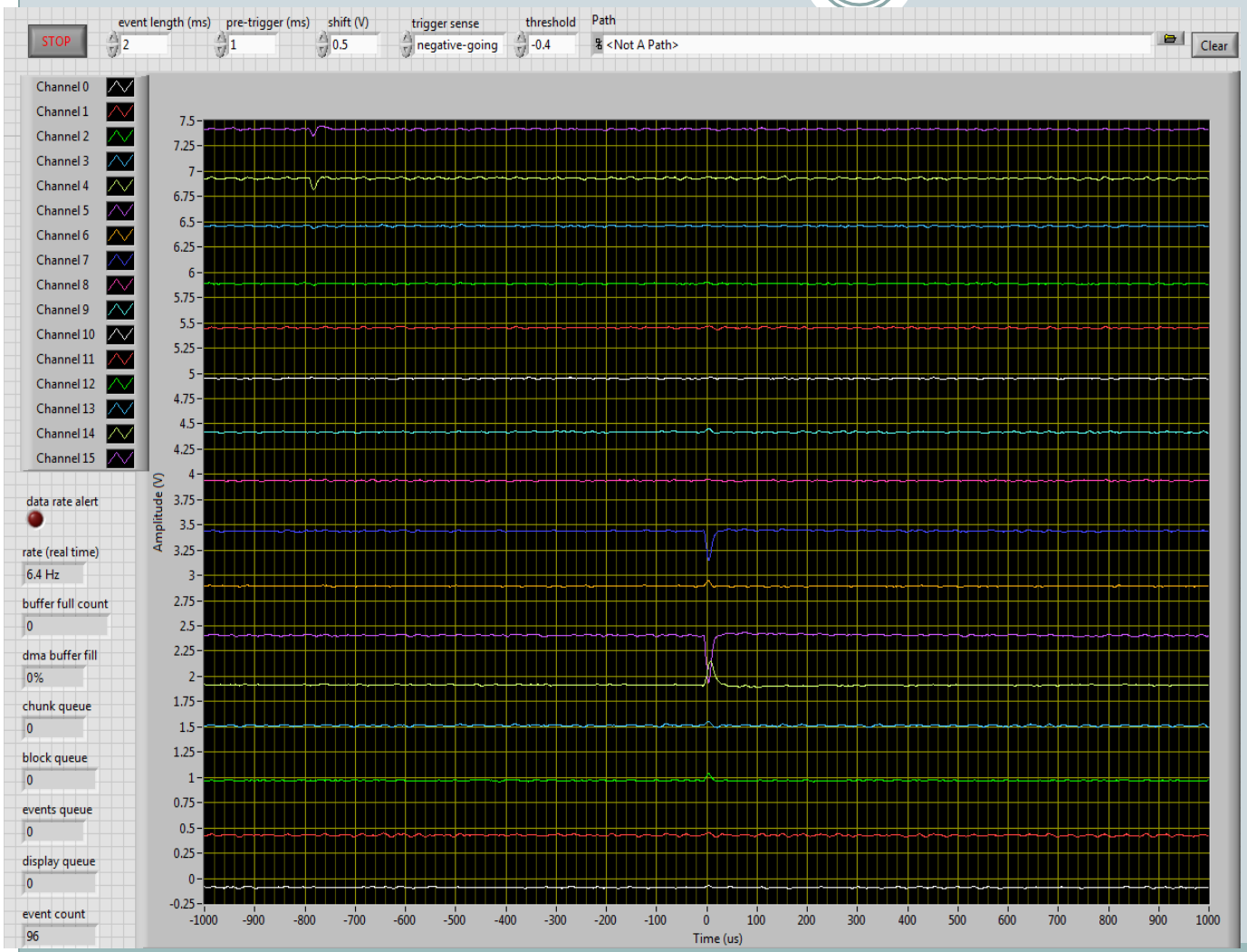
Last time

- We found that all signal channels of our detector don't trigger when exposed to alpha in SF6.
- There was a question whether the operational field (~350 V/cm) was enough to drift the heavier drifting (relative to electrons) SF6 anions.
- To test this, we built a new field cage that runs at higher drift field, up to 1000 V/cm.

Result at higher drift field

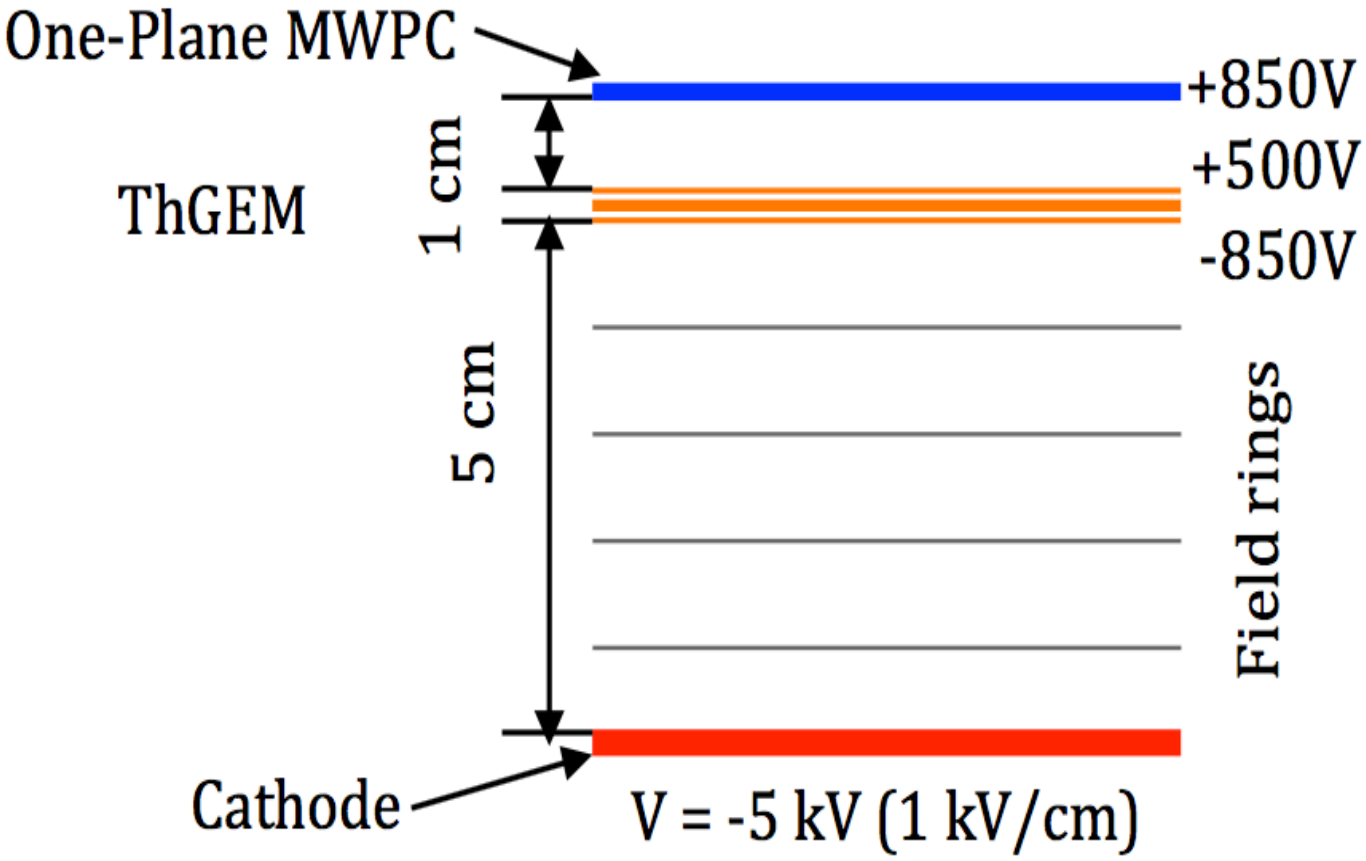


Note: in CF_4, we see charge signals on all the channels.

So what else is going on?

- Effects of SF6 quenching on ionization energy of alpha tracks as they slow down?
- Which requires high gain?
- To test this, we built a MWPC+ThGEM hybrid detector.

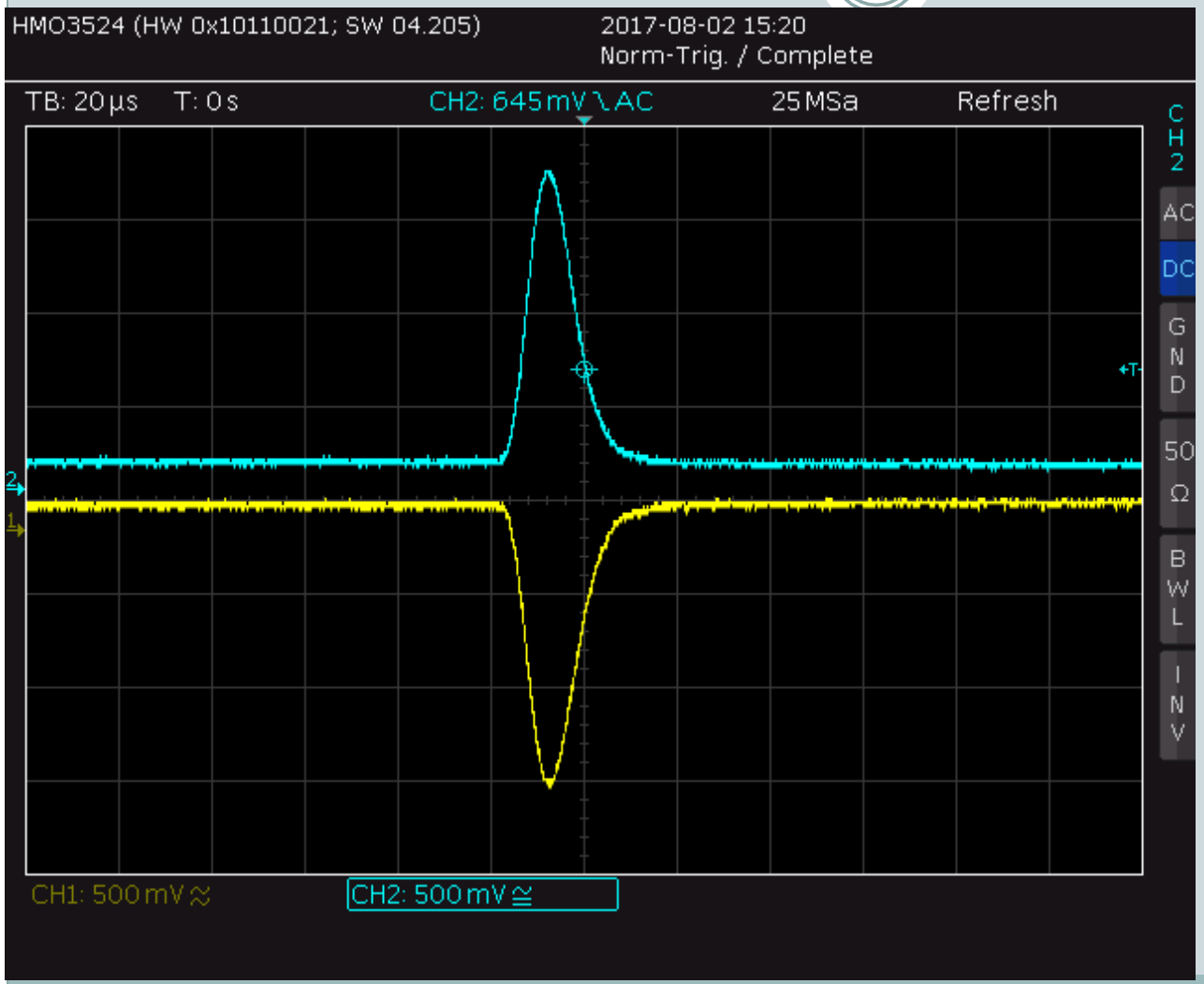
MWPC+ThGEM Hybrid Detector



ThGEM Used

Pitch:	0.8 mm
Hole diameter:	0.56 mm
Thickness:	1 mm
Rim Size:	0.04 mm

ThGEM Response

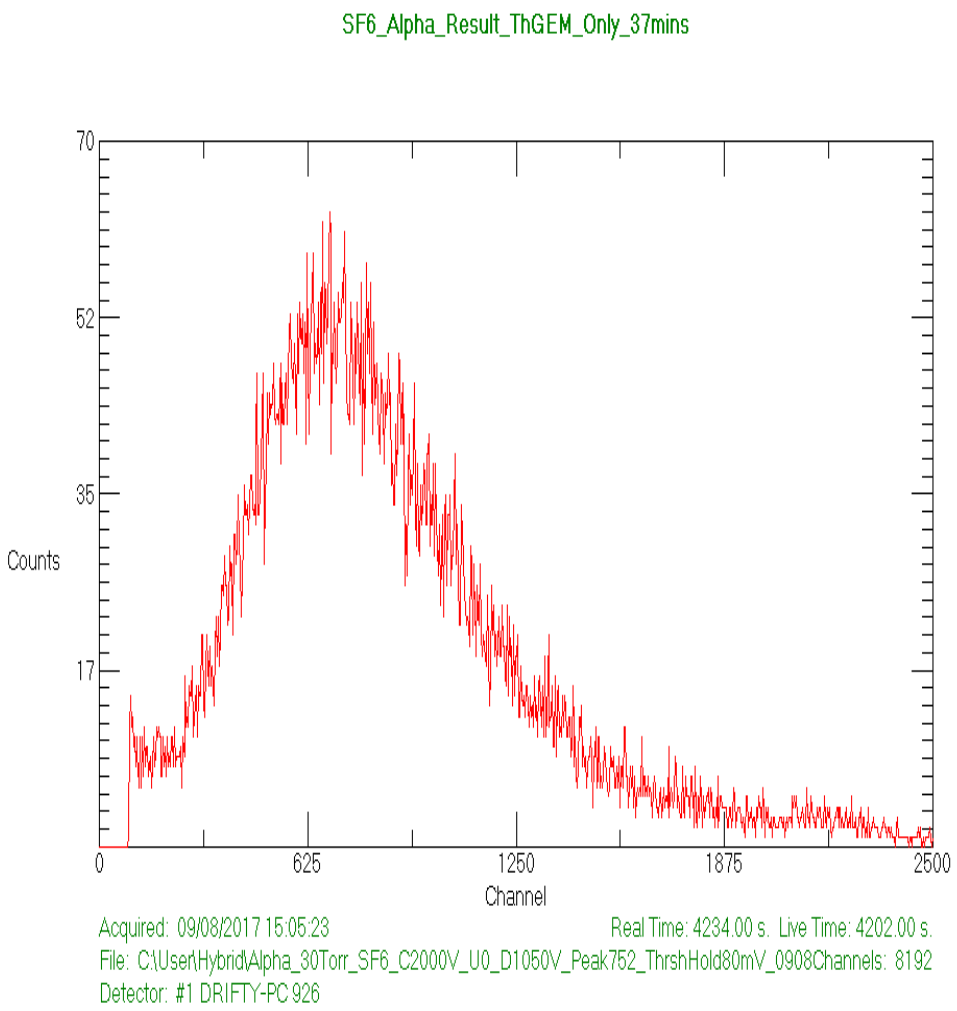


Gas: SF6

Pressure: 30 Torr

ThGEM delta-V: 1350 V

Gas Gain of the ThGEM



Source: Am-241, 5.5 MeV

Gas: SF6

Pressure: 30 Torr

Range of track: 28 cm

Energy deposited within the fiducial volume (SRIM): 0.34 MeV

ThGEM Delta-V: 1050 V

Peak channel: 752

Gas gain: 1270

Wires in the hybrid setup

- Charge signals on the wires are not different from what we observed without the ThGEM in place.

- Also,ThGEM sparks at avalanche fields >13,500 V/cm, so can't run at higher delta-V.

What next?

- Will need to test the readout at higher avalanche field

- We have ordered a CERN ThGEM:

Hole pitch	-	0.6 mm
Hole diameter	-	0.4 mm
Rim Size	-	0.05 mm
Thickness	-	0.4 mm